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Resolve QR: A QR Code-Based Smart Grievance Redressal System for Campus Infrastructure Complaints

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Abstract - Complaints about campus infrastructure, such as broken furniture, faulty lights, water leakage and damaged laboratory equipment, are still mostly reported through paper forms, complaint boxes or verbal requests. These channels often miss the exact location of the fault, give the complainant no way to track progress and make it hard to fix responsibility. This paper presents Resolve QR, a QR code-based web system in which a code placed at each campus location opens a complaint form already linked to that location. The system has three roles, Student, Administrator and Technician, and follows every complaint from submission through assignment to resolution. It is built with a Spring Boot backend and a MySQL database. The system gives students a quick way to report problems, gives administrators a single place to monitor them and gives technicians a clear list of assigned work.

Key Words: Campus infrastructure, Grievance redressal, MySQL, QR code, Spring Boot, Web application.

1. INTRODUCTION

Educational institutions maintain a large amount of physical infrastructure: classrooms, laboratories, hostels, washrooms, libraries and playgrounds. When something breaks, the person who notices it is usually a student or a staff member, not the person who can fix it. The report then has to travel through a complaint register, a written application or a word of mouth message before it reaches the right department.

This manual route has well known problems. The complaint often does not say exactly where the fault is. The complainant cannot see whether anyone has looked at it. The administration has no record that shows how many complaints are open, how long they have been open and who is working on them. Complaints that are not followed up lose the trust of the people who raised them.

A QR (Quick Response) code is a two-dimensional barcode that a smartphone camera can read in a second [1]. If a QR code is fixed near an asset or at a room entrance, scanning it can open a web page that already knows the location. This removes the need to describe the place and makes reporting a task of a few seconds.

This paper presents Resolve QR, a Smart Grievance Redressal System that applies this idea to campus infrastructure complaints. The main contributions are: (i) a location-linked complaint form reached through QR codes, (ii) role-based handling by Student, Administrator and Technician users, and (iii) status tracking of each complaint until it is resolved.

2. LITERATURE SURVEY

QR codes have been used in several institutions to make complaint submission easier. A final year project report at Universiti Malaysia Sarawak proposed a facilities reporting system for college residents in which scanning a QR code takes the user directly to a reporting website, replacing the paper form handed in at the management office [2]. The Technical University of Kenya introduced a digital suggestion box reached through a QR code, which allows anonymous submission and delivers the complaint immediately to a designated address [3]. Al-Mustaqbal University placed QR codes near the complaint boxes of its departments so that students can submit complaints and suggestions electronically and have them followed up [4].

Web-based complaint systems have also been built for universities. Al-waeli and Hassan describe an online student complaint management system developed with PHP and MySQL for universities that do not have such a system [5]. Dahri and Yusof developed an online damage complaint system for a university residential college, with modules for login, complaint management, notification, feedback and reports, used by students, college staff and the maintenance office [6]. Kotwal et al. present a web-based public grievance portal built on a three-tier architecture with ReactJs and MySQL, and report a 40% reduction in resolution time in their evaluation [7]. A final year project at Universiti Malaysia Sarawak built a web-based complaining system for the students of a faculty, in which students can follow the progress of their complaints [8].

QR codes have also been used in other campus systems, mainly for attendance. Tanjunng and Fahmi developed a web application that records lecture attendance with QR codes [9]. Abu Sneineh and Salah built a system in which a QR reader connected to a PIC microcontroller reads the student ID card and stores the attendance in a database [10], and a QR-based attendance system for examination invigilators using PHP, CodeIgniter and MySQL was reported at Sebha University [11]. These studies show that a QR code can link a place or a person to a database record in a few seconds, which is the same idea Resolve QR applies to campus locations.

Research on complaint handling in general points in the same direction. Complaint management has been described as an information process that identifies and corrects the causes of dissatisfaction [12]. An analysis of online customer complaints discusses how complaints can be handled and gives guidelines for developing a web complaint management system [13], and work on suggestion systems describes how ideas from users are captured, considered and followed up [14].

QR codes and barcodes have also been applied to facility maintenance. Chen and Lin developed a mobile 2D barcode-based system in which a user scans the code on a classroom property to report a breakdown, and the maintenance worker scans the same code to update the repair status; the system was tested at a university in Taiwan [15]. Lin et al. had earlier proposed a mobile 2D barcode and BIM-based facilities maintenance management system [16]. Gastiadi et al. built a web-based facility maintenance monitoring system for a university building using Vue.js, Express.js and PostgreSQL, with damage reporting through QR code scans, automatic scheduling of technicians by a genetic algorithm, and notifications; they report a 100% feature success rate in alpha testing [17]. Azzahra and Suakanto proposed a barcode-based asset management system for a hospital, in which QR codes support asset identification and monitoring [18].

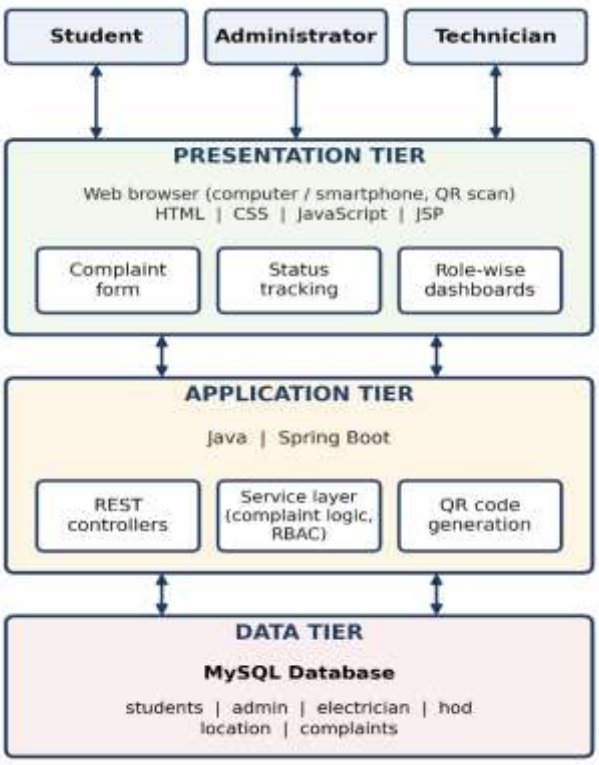
Many other web-based complaint systems have been reported. Nasr and Alkhider presented an online complaint management system [19], and Suvetha et al. a web application for managing and resolving complaints of the public [20]. Oguntosin et al. developed a web-based complaint management platform for a university community [21], Anusiuba et al. a web-based student complaint management system for a tertiary institution [22], and Fabiyi et al. a web-based campus complaint management system (WCCMS) [23]. Muzones and Pomperada designed a complaint management system for a university campus in the Philippines, where students, faculty and staff submit complaints about academic services, infrastructure, administrative responsiveness and campus management through a web interface [24]. Osunniyi and Adedokun describe a cloud-based complaint management system for university grievance handling that uses role-based access control, PostgreSQL, MongoDB and AWS [25]. Outside education, Lee and Zhao worked on data collection, data mining and transfer of learning for a customer complaint handling system and built a complaint handling dataset [26].

Taken together, these works show that QR codes are accepted as an entry point for complaints and that web-based complaint systems are common in universities. The material we reviewed concentrates on collecting feedback. Existing complaint management systems provide digital complaint submission and tracking, but the reviewed studies show limited integration of location-specific QR-based reporting with a complete campus complaint workflow. Some systems focus mainly on complaint collection, while others provide tracking or automated routing without linking the complaint directly to a physical campus location. Resolve QR addresses this gap by connecting a location-specific QR code with complaint registration, role-based assignment, technician status updates, and complaint verification within a centralized web-based system.

3. PROBLEM STATEMENT AND OBJECTIVES

Campus infrastructure complaints are reported through channels that do not capture location, do not show progress and do not record who is responsible. The objectives of Resolve QR are:

1) to let a user report a fault by scanning a QR code at the place of the fault; 2) to attach the location to the complaint automatically; 3) to let the administrator review complaints and assign them to technicians; 4) to let the technician update the status of the work; and 5) to let the complainant follow the status until the complaint is closed.



4. PROPOSED SYSTEM

4.1 Architecture

The system follows a three-tier architecture. The presentation tier is a web interface developed using HTML, CSS, JavaScript, and JSP, which can be accessed through a web browser on a computer or smartphone. The application tier is implemented using Spring Boot and handles the application logic and complaint management operations. The data tier uses a MySQL database to store user information, locations, complaints, and their status details.

Figure 1 : System Architecture

4.2 User Roles

The system has three roles. Table 1 summarises what each role can do.

Table -1: User Roles and Functions

Role	Main functions
Student	Scan QR code, submit complaint, view status of own complaints
Administrator	Review complaints, assign technician, manage locations and QR codes, monitor all complaints
Technician	View assigned complaints, update work status, mark complaint as resolved

4.3 Complaint Workflow

The complaint management process follows a structured workflow from complaint registration to verification. First, the administrator registers the campus location or facility and associates a QR code with it. The student scans the QR code and submits a complaint by providing the required details and, where applicable, an image of the issue. The complaint is stored in the centralized database with a Pending status. The administrator reviews the complaint and assigns it to the concerned technician. The technician accepts the complaint, visits the reported location, performs the required maintenance, and updates the complaint status to In Progress and subsequently to Resolved. The technician can provide before-

and-after images as evidence of the work performed. After resolution, the student verifies whether the issue has been properly resolved and provides feedback and a rating. The complaint is then marked as Verified, completing the complaint lifecycle.

5. IMPLEMENTATION

5.1 Technology Stack

The backend is implemented in Java using Spring Boot, which provides the application logic, REST controllers [27], service layer, and database connectivity. MySQL is used as the relational database for storing user, location, complaint, and status-related information. The presentation layer is developed using HTML, CSS, JavaScript, and JSP to provide the web-based user interface for students, administrators, and technicians.

Access to the functions of the system is separated by role. Role-based access control (RBAC) associates permissions with roles and makes users members of the appropriate roles [28]; this work was later developed into the NIST model for RBAC [29] and a proposed NIST standard [30]. In Resolve QR each user role sees only its own functions, as checked in the access control test in Table 2.

5.2 Database Design

The database is implemented using MySQL and is organized into six main tables: admin, complaints, electrician, hod, location, and students. The students table stores student-related information, while the admin, electrician, and hod tables maintain information related to the respective users and roles. The location table stores information about campus locations associated with complaints. The complaints table maintains complaint-related information, including the reported issue and its status during the resolution process. These tables collectively support centralized storage and management of complaint information throughout the grievance redressal workflow. The relational model introduced by Codd [31] stores data in tables whose rows are linked through common columns, which is the model followed by MySQL, and the normal forms and integrity constraints described in database textbooks [32] guide the design of such tables.

5.3 QR Code Generation

QR codes are generated for specific campus locations and are associated with the corresponding location information stored in the system. When a student scans a QR code, it directly opens the complaint form for the respective location. The student can then enter the complaint details and submit the issue without manually selecting or entering the location. This location-based QR approach simplifies complaint registration and helps ensure that the complaint is associated with the correct campus location.

6. TESTING AND RESULTS

The system was tested by executing functional test cases for the major modules of the Resolve QR system. The testing focused on QR-based complaint registration, complaint submission and database storage, technician assignment, complaint status updates, and role-based access. Each module was checked to verify whether the expected operation was performed correctly and whether the information was reflected in the system as intended. Table 2 lists the functional tests carried out on the main modules. These tests correspond to the functional suitability characteristic of the ISO/IEC 25010 software quality model [33]; other characteristics, such as usability, need a separate evaluation.

Table -2: Functional Testing

Module	Test case	Result
QR scan	Scan opens form with correct location	Pass
Complaint	Submit complaint and store in database	Pass
Assignment	Administrator assigns technician	Pass
Status	Technician updates status, student sees it	Pass
Access control	Each role sees only its own functions	Pass



Fig -1: Student Registration of the Resolve QR system

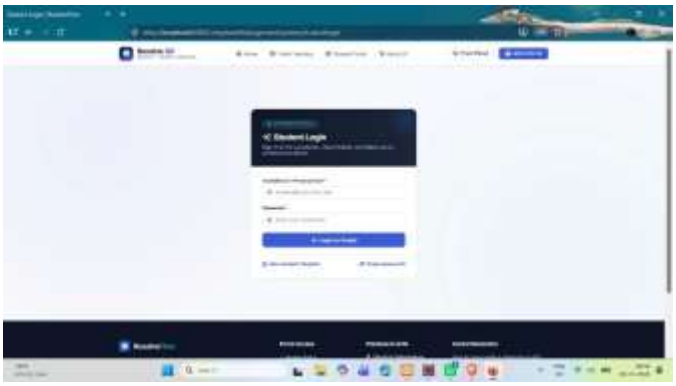


Fig -2: Student login interface

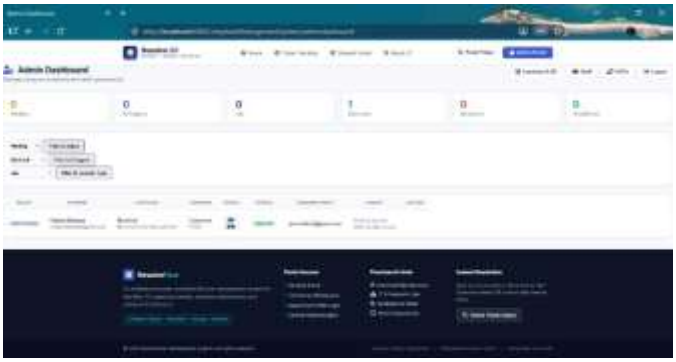


Fig -3: Admin dashboard for complaint monitoring and assignment

7. DISCUSSION

Table 3 compares the manual method with Resolve QR on the features that matter for complaint handling.

Table -3: Manual Method versus Resolve QR

Feature	Manual method	Resolve QR
Location of fault	Written by the complainant, often incomplete	Taken from the scanned QR code
Progress tracking	Not available	Status visible to the complainant

Feature	Manual method	Resolve QR
Responsibility	Not recorded	Technician assigned and recorded
Record keeping	Paper register	Database with history

The main limitation of the system is that a student needs to be near the registered QR code location to access the location-specific complaint form. The system also depends on the administrator maintaining accurate and up-to-date location information.

8. CONCLUSION AND FUTURE SCOPE

Resolve QR replaces paper and verbal complaint channels with a QR code-based web system that captures the location of a fault, routes the complaint to a technician and lets the complainant follow its status. The system is built on Spring Boot and MySQL and uses three roles to keep the work of each user separate.

Future work can include email or SMS notifications, a mobile application, advanced analytics for complaint trends and resolution time, priority levels for urgent complaints, GPS or map-based location support, predictive maintenance features, and support for multiple campuses or organizations. A formal usability evaluation can also be carried out, following established usability engineering practice [34], with the System Usability Scale (SUS) [35]; SUS scores have been studied on 2,324 surveys from 206 usability tests [36] and linked to adjective ratings [37].

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